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Paper Title:	iMESA: An Integrated, Miniaturized, Electrostatic Analyzer
	<p>This paper discusses the design, building, and purpose of the Integrated Miniaturized Electrostatic Analyzer (iMESA) instrument being constructed at the United States Air Force Academy as a Senior Cadet Capstone Design project. The instrument uses a new laminated electrode design which provides a high-pass energy filter (similar to a retarding potential analyzer) for ions or electrons. By varying the voltage across the electrodes, the entire energy distribution of the ions in Low Earth Orbit (LEO) can be obtained. From the data we derive the plasma density, temperature, and spacecraft charging. These measurements are then assimilated into ionospheric models, improving both the “nowcast” and forecast of the ionosphere. The design is simple, reliable, and has a low size, weight and power (SWAP) requirement from the host spacecraft.</p>
Abstract:	<p>The instrument is a multi-disciplinary cadet project including cadets from the departments of Physics and Electrical and Computer Engineering. The current design includes an improved electrostatic analyzer design, as well as a dosimeter providing total dose and dose rate. An earlier design is presently flying on STPSat-3. We are currently building four of these newer flight instruments which will be flying on STPSat-4, STPSat-5, Green Propellant Infusion Mission (GPIM), and the Orbital Test Bed (OTB). All four missions are sponsored by the Department of Defense Space Test Program (DoD STP). Due to the small size (~10cm x 10cm x 5cm), light weight (< 1kg), and low power (~2.5W) this instrument lends itself to deployment on almost any platform from large satellite to small “cube sat” size buses. Many deployments will enhance the “in-situ” measurements of the low-earth orbit environment, thus increasing the fidelity of space environment models.</p>